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Students' Satisfaction on Their Learning Process in Active Learning and Traditional Classrooms

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Studies have shown Active Learning Classrooms [ALCs] help increase student engagement and improve student performance. However, remodeling all traditional classrooms to ALCs entails substantial financial burdens. Thus, an imperative question for institutions of higher education is whether active learning pedagogies can improve learning outcomes when classroom resources are limited. In this study, we examined the effect of active learning pedagogies on students' satisfaction of learning processes in ALC and Traditional Classrooms [TCs]. The results show that active learning pedagogy activities are significant factors that increase students' satisfaction with their individual and group learning processes. In addition, active learning pedagogical activities in both TCs and ALCs influence students' satisfaction with their learning processes positively.

Teaching is not pouring knowledge into a student's head anymore. "To teach is to engage students in learning." (Christensen, Garvin, & Sweet, 1991, p. foreword, xiii). Since Russ Edgerton introduced the "pedagogies of engagement" concept in *Education White Paper* in 2001, a great deal of effort has been exerted to increase student engagement in college and university classrooms. As a result, different kinds of learning methods, such as collaborative learning, cooperative learning, and problem-based learning have emerged to promote student engagement in higher education (Prince, 2004; Prince & Felder, 2007). All these methods fit into an emerging category of pedagogy called "active learning."

Prince (2004) defined active learning as any instructional method other than lecture that engages students in learning. Prince's definition of active learning emphasizes the instructor's role in the classroom. At the same time, many other researchers also suggested learning space is important for students to participate in active learning. As part of professional development at a private liberal arts institute, several classrooms were converted into Active Learning Classrooms (ALCs) to enhance active learning. Faculty members who were interested in teaching in ALCs and educating themselves about active learning pedagogy were encouraged to participate in a learning community brought together for this purpose. The faculty met once a month to discuss active learning methods and committed themselves to applying active learning pedagogy to their classrooms. Not surprisingly, this generated a greater demand for ALCs than there were ALCs available. The faculty who had taught in ALCs wanted to continue to teach in ALCs, while other faculty members who were not part of the study became interested in utilizing ALCs to help students engage with their learning, their classmates, and their teachers in the classrooms. However, it was not financially practical to change all the classrooms on campus to ALCs. This situation prompted the question of whether utilizing active learning activities in classrooms that were set up to accommodate traditional lecture style teaching could bring positive changes in students' engagement in the classroom. In order to determine the impact of active learning pedagogy on students, this study used an assessment tool to measure student satisfaction with their individual and group learning processes in both ALCs and traditional classrooms. Students in sixteen classrooms of various disciplines were surveyed, and the results were used to answer the following questions:

- Are students satisfied with their individual learning processes when active learning pedagogy is used in a traditional classroom?
- Are students satisfied with their group learning processes when active learning pedagogy is used in a traditional classroom?
- Does a classroom have to be configured as an active learning classroom to successfully accommodate active learning pedagogical activities?
- Can active learning pedagogy be executed effectively in traditional classrooms?

Literature Review

Active learning, especially in the engineering field (Prince, 2004), has received a great deal of attention from researchers. While there are many complications and challenges for researchers studying the impact of active learning (Prince, 2004), most of the studies clearly show that active learning does positively impact students' ability to retain and understand new material. Many researchers (Braxton, Sullivan, & Johnson, 1997; Hurtado & Cater, 1997; Pascarella & Terenzini, 1991; Stage & Hossler, 2000) documented that student interactions, not only with other students but also with faculty, were predictors of student persistence and quality learning. In a study that examined

faculty practices, student engagement, and student perceptions, Umbach and Wawrzynski (2005) found that the more faculty interacted with the students, the more students were challenged and engaged in meaningful activities. Also, students reported increased gains in personal/social development and general knowledge. These results are consistent with research done by Astin (1993), which found student interaction is determined to be the most important factor affecting student learning. Compared to a standard lecture format, active learning instructional approaches help improve students' attitudes (see Armbruster, Patel, Johnson, & Weiss, 2009; Marbach-Ad, Seal, & Sokolove, 2001; Mills & Cottell, 1998; Prince, 2004; Preszler, Dawe, & Shuster, 2007) and increase students' ability to think and write (Bonwell, & Eison, 1991; de Caprariis, Barman, & Magee, 2001; Johnson, Johnson, & Stanne, 2000; Jungst, Licklider, & Wiersema, 2003). In addition, active learning instructional approaches positively impact learning outcomes (Armbruster et al., 2009; Ebert-May, Brewer, Sylvester, 1997; Freeman, & Herron, 2007; Hake, 1998; Knight & Wood, 2005; Udovic Morris, Dickman, Postlethwait, & Wetherwax, 2002; Walker, Cotner, Baepler, & Decker, 2008). Further, active learning classroom instructional approaches have been tried and appreciated beyond engineering classrooms while studies in courses other than engineering and sciences classes is scarce. The results of a study with students, whose first spoken language is not English, in anatomy and physiology classes show increased attendance, participation, and achievement among students who learned through active learning pedagogical approaches (Termos, 2013). Students in math education who experienced active engagement in the classroom reported their satisfaction in understanding content and maintaining interest and attention (Cavanagh, 2011). Finally, Johnson, Johnson, and Smith's (1991) research shows that student-centered learning can also be applied in large classrooms.

Not only are there numerous studies that show active learning methods work to enhance students' success in the classroom, there are also numerous resources available to support faculty committed to applying active learning pedagogy to their courses. As indicated in the work of Armbruster and colleagues (2009), several national programs such as The National Academies Summer Institutes and FIRST II (Faculty Institutes Reforming Science Teaching II) are committed to help faculty transform the way they teach by providing workshops, seminars, and venues where faculty help other faculty. There are also several database repositories of active learning exercises for faculty to find resources to promote active learning pedagogy in higher education. These include "MERLOT pedagogy portal, TIEE, FIRST II, National Digital Science Library, and especially BioSciEdNet and SENCER Digital Library" (Armbruster et al., 2009, p. 204).

In addition, classroom space has become a focus of interest, in the light that changing traditional classrooms into spaces that more readily accommodate the active learning pedagogy would effectively promote learning outcomes. Currently, there are three major pioneer projects in higher education that focus on changing the classroom space to enhance active learning pedagogy. One of these is the SCALE-UP project—Student-Centered Active Learning Environment for Undergraduate Programs—operated by North Carolina State University, Raleigh (Beichner, n.d.) project. In this project classrooms are equipped with round tables to facilitate student group work more easily. In addition, laptop connectors, projectors, and wall screens help students share their work both with each other and with the class as a whole. In these classrooms, the instructor is positioned at a podium in the center of the room. The instructor may assign problems to the student groups, is able to easily move around the room to help facilitate group learning, and can then draw the whole class's attention to individual or group work. A study on the SCALE-UP project showed (Beichner, Saul, Allain, Deardorff, & Abbott, 2000) that changing the classroom space enhances student learning by increasing student attendance, increasing the level of conceptual learning, enhancing problem solving skills, and improving student attitudes toward learning. Similar to SCALE-UP, TEAL [Technology Enabled Active Learning] which is operated by Massachusetts Institute of Technology, not only changed space but also added software that may enhance visualization and simulations. One study on TEAL showed that the project seemed to succeed in lowering the failing rates and increasing the level of understanding concepts. (Dori, Barak, & Adir, 2003) Finally, the University Minnesota launched Active Learning Classrooms (ALCs). ALCs are featured with "a 360 degree glass-surface marker board, multiple flat-panel display projection systems, roundtables that accommodate nine students each, and a centered teaching station that allows selection and display of table-specific information."(http://www.classroom.umn.edu/projects/ALCOverview.html)

While the ALCs are described as modification from SCALE UP and TEAL (http://www.classroom.umn.edu/projects/ALCOverview.html), it seems that the ALCs are very similar to SCALE-UP classrooms. Brooks (2012)'s study on ALCs indicated very interesting aspects of instructors' and students' behaviors. The lecture type of delivery was observed more in traditional classroom than in ALCs, while instructors tried to deliver the course in the same way (Brooks, 2012). Although group activities observed were not significantly differently in ALCs than in traditional classrooms, Brooks' (2012) study on the impact of space on students' and instructors' behaviors

indicated that space influences students' and instructors' behaviors that, in turn, would influence student engagement in learning.

In his study, Brooks (2012) also discussed different spaces (traditional classrooms and ALCs) can be used more appropriately to different types of teaching methods. What may be more important is to recognize that traditional classrooms may be appropriate for lecture delivery and active learning classrooms are more suitable for student engagement.

Methods

As aforementioned, we examined the effect of active learning pedagogies on students' satisfaction of learning processes in active learning classrooms and traditional classrooms. In order to do this, we categorized students' satisfaction of learning processes (dependent variable) into individual and group learning processes, as students in our sample were required to work individually and in groups, depending on the activities in class. Next, we modeled our hypotheses to test whether active learning pedagogical activities will generally influence students' satisfaction in individual and group activities (Hypotheses 1 & 2), as well as whether active learning pedagogical activities will influence students' satisfaction in individual and group activities in traditional classroom settings (Hypotheses 3 & 4). Since Hypotheses 3 and 4 examined the relationship between active learning pedagogies and students' satisfaction of learning processes in traditional classrooms, we used a subset of our sample to focus on traditional classrooms only. Therefore, we provided descriptive statistics (Table 2) and the results of our regression models (Table 3 & 4) using the total sample for Hypotheses 1 and 2 while providing descriptive statistics (Table 5) and regression models (Table 6 & 7) using a subset of our sample focusing on traditional classroom settings for Hypotheses 3 and 4. Ordinary least squares (OLS) regression models were used to test the hypotheses in our study. In the following sections, we explain our sample, procedures, variables, and results.

Participants

For this study, we surveyed sixteen classes in a private liberal arts university taught by seven different faculty using a student assessment tool that was created for the University of Minnesota STSS Research Project. While the survey was available online, this survey was used with permission of the director of the STSS project. We altered the original first five questions by adding questions that elicited information on age, gender, major, and year in school. The classes in our study included eleven undergraduate classes and five graduate courses. Five of the classes were taught in active learning classrooms (four undergraduate and one graduate), and eleven of the classes were taught in traditional classrooms (seven undergraduate and four graduate). These classes represented a variety of disciplines. For the undergraduate classes, business, economics, geography, political science, and theology were represented with some classes serving majors and some serving non-majors as a part of their liberal arts study, and others were populated with a combination of majors and non-majors. The graduate classes surveyed included courses in business and education, serving graduate programs in Business Administration, Education Administration, and School Counseling.

Procedure

In the eighth and ninth week of the ten-week quarter, depending on the class schedule, a FERPA-trained student research assistant visited the designated class and administered the survey to the students. The Informed Consent Form was attached to the survey, and a student signified their consent by filling out the survey. In order to protect their privacy, all students were instructed to remain in their seats for the twenty minute period allowed for the survey so that those who did not participate were not distinguishable from those who did. The faculty member was also asked to leave during this time. To maintain procedural consistency, the Informed Consent form and its accompanying questionnaire were administered by the same FERPA trained research assistant in most of the classes. At the end of each survey, the research assistant delivered the completed and uncompleted surveys to the institution's Instructional Technology Office where the results from all the surveys were entered into a specially created SurveyMonkey by a FERPA trained student worker employed by the institution's Instructional Technology Services office.

In order to facilitate analysis, the responses were coded. For questions nine through forty, answers were coded as Strongly agree = 4, Agree = 3, Disagree = 2, Strongly disagree = 1. For questions forty-one through fifty-eight answers were coded thusly: More than once per class = 8, About once per class = 7, About once a week = 6, Two or three times a month = 5, About once a month = 4, Two or three times a quarter = 3, About once a quarter = 2, Never = 1. For questions fifty-nine through sixty-one the responses were coded: Easy = 5, Somewhat easy = 4, Neither easy nor difficult = 3, Somewhat difficult = 2, Difficult = 1.

Because we did not link student answers to individual students in order to protect their privacy, it was possible for a student to take our test more than once by virtue of being in two or more of the classes in our study. Since we asked each student to answer the questionnaire focusing on the class in

which the survey was administered, the negative effects appeared minimal.

Variables

Student Satisfaction. This dependent variable was constructed from a principal components analysis to reduce the twenty-eight measures of student satisfaction into dependent variables for regression analyses. The twenty-eight items (numbers 9-36) were based on the University of Minnesota STSS Research Project survey that were designed to measure student satisfaction. These items used a 4-point Likert scale (1 = Strongly disagree, 2 = Disagree, 3 = Agree, 4 = Strongly agree). Results showed that a simple structure of loadings was achieved by extracting two components from eight measures of student satisfaction, which accounted for 65.85 percent of the total variance explained (Table 1).

The Kaiser-Myer-Olkin measure of sampling adequacy (MSA) for the set of variables was .87, exceeding the recommended minimum of .50 for overall MSA (Kaiser, 1974). Bartlett's test of sphericity was statistically significant at $p < .001$. After a further examination of the dimensions of the components, student satisfaction was operationalized into two dependent variables for our analyses. These two were 1) student satisfaction in promoting participation with regard to group-based activities (e.g., "Helps me develop connections with my classmates."), and 2) student satisfaction in promoting individual development with regard to understanding subject matter and professional skills (e.g., "Helps me to define issues or challenges and identify possible solutions."). Thus, the two dependent variables were designated $satisfaction_{group}$ and $satisfaction_{individual}$ respectively. Internal consistency for these two dependent variables was good, Cronbach's $\alpha = .87$ for $satisfaction_{group}$ and Cronbach's $\alpha = .86$ for $satisfaction_{individual}$. The mean scores were used for analysis: a higher score indicated higher student satisfaction.

Active Learning Pedagogy. Eighteen items (numbers 41-58 on the survey) from the student assessment tool created for the University of Minnesota STSS Research Project were used to assess the amount of active learning pedagogy present in each class. Each of these eighteen items focused on a different aspect of active learning pedagogy. For example, one item focused on whether or not students worked in small groups (2-3) on an in-class learning activity, and another focused on the degree that "the instructor consulted with individual students during an in-class learning activity." To facilitate the assessment of the level of active learning pedagogy, each variable counted as a measure of active learning pedagogy when the activity was present at least "once a week" or more. This meant that the variable "Active Learning Pedagogy" had a potential range of 1 to 18 with a mean of 9.90 (*S.D.* = 4.10 and had approximate normality (skewedness = -.12).

Classroom type, Student Sex, and Course Level. A dummy variable (traditional classroom, active learning classroom) was used to indicate the type of classroom in which a given course was held. Students' sex (male, female) and the level of course (undergraduate, graduate) were also dummy coded to be included in the regression analyses as control variables.

Results

Hypothesis 1: Active learning pedagogical activities will influence students' satisfaction with their individual learning process positively. Table 2 displays the means, standard deviations, and bivariate correlations for Hypotheses 1-2, which are regressions using the dependent variables $satisfaction_{individual}$ (Hypothesis 1) and $satisfaction_{group}$ (Hypothesis 2) on classroom type and active learning pedagogy. The variables that significantly correlated with $satisfaction_{individual}$ were active learning pedagogy ($r = .16$, $p < .01$) and classroom type ($r = -.13$, $p < .01$). The variables that significantly correlated with $satisfaction_{group}$ were also active learning pedagogy ($r = .15$, $p < .01$) and classroom type ($r = -.12$, $p < .01$).

We conducted an ordinary least squares (OLS) regression analysis to predict student $satisfaction_{individual}$ from active learning pedagogy (Table 3 displays the results). Predictors were entered hierarchically: Model 1 includes control variables only (e.g., sex, level of course), Model 2 includes control variables and classroom type (e.g. traditional vs. active learning classroom), and Model 3 includes all variables including active learning pedagogy. Model 2 explained a proportion of the variance in student $satisfaction_{individual}$, $R^2 = .15$, F (3, 349) = 2.69, $p = .047$. Classroom type was a statistically significant predictor of student $satisfaction_{individual}$, $B = -.16$, $p = .017$, suggesting that with control variables held constant, the active learning classroom was associated with higher student $satisfaction_{individual}$ as compared to a traditional classroom. Model 3 explained a proportion of the variance in student $satisfaction_{individual}$, $R^2 = .20$, F (4, 348) = 3.52, $p = .008$. Active learning pedagogy was a statistically significant predictor of student $satisfaction_{individual}$, $B = .02$, $p = .016$, supporting Hypothesis 1, suggesting that with control variables held constant and the classroom type considered, the number of active learning pedagogy methods was positively associated with student $satisfaction_{individual}$. Sex of the student ($B = -.06$, $p = .322$) and level of course ($B = -.12$, $p = .063$) were not statistically significant.

Table 1
Component Analysis for Student Satisfaction (Dependent Variable)

Dependent Variable	Questions
"Satisfaction$_{individual}$"	Q11: Helps me develop professional skills that can be transferred to the real world Q27: Helps me to define issues or challenges and identify possible solutions Q30: Deepen my understanding of a specific field of study
"Satisfaction$_{group}$"	Q10: Facilitates multiple types of learning activities Q13: Helps me develop confidence in working in small groups Q14: Promotes discussion Q15: Encourages my active participation Q18: Helps me develop connections with my classmates

Table 2
Bivariate Correlations, Means, and Standard Deviations for the First-round Study Variables

Variable	1	2	3	4	5	6
Student satisfaction$_{individual}$	—					
Student satisfaction$_{group}$	.96***	—				
Student's sex	-.08	-.07	—			
Level of course	.01	-.01	-.13***	—		
Type of classroom	-.14***	-.13**	.10	.12**	—	
Active learning pedagogy	.16***	.15***	-.13**	.21***	-.19***	—
N	361	361	356	361	361	358
M	2.66	2.69	.63	.17	.69	10.37
SD	.56	.58	.48	.38	.46	3.98

*p < .10; **p < .05; ***p < .01.

Table 3
Ordinary Least Squares Regression Analyses Predicting Student Satisfaction$_{individual}$ from Active Learning Pedagogy

Predictor	*B*	β	*t*	R^2
Model 1				.11
Student's sex	-.09	.06	-1.47	
Level of course	.00	.08	.10	
Model 2				.15**
Student's sex	-.07	.06	-1.70	
Level of course	.03	.08	.41	
Type of classroom	-.16**	.07**	-.24**	
Model 3				.20***
Student's sex	-.06	.06	-.99	
Level of course	-.01	.08	-.15	
Type of classroom	-.12*	.07*	-1.87*	
Active learning pedagogy	.02**	.01**	2.43**	

*p < .10; **p < .05; ***p < .01.

Table 4

Ordinary Least Squares Regression Analyses Predicting Student Satisfiaction$_{group}$ from Active Learning Pedagogy

Predictor	*B*	β	*t*	R^2
Model 1				.11
Student's sex	-.09	-.07	-1.36	
Level of course	-.03	-.02	-.39	
Model 2				.14*
Student's sex	-.07	-.06	-1.08	
Level of course	-.01	-.01	-.10	
Type of classroom	-.15*	-.12*	-2.16*	
Model 3				.18*
Student's sex	-.06	-.05	-.91	
Level of course	-.05	-.04	-.64	
Type of classroom	-.11	-.09	-1.64	
Active learning pedagogy	.02**	.13**	2.36**	

*p < .10; **p < .05; ***p < .01.

Table 5

Bivariate Correlations, Means, and Standard Deviations for the Second-round Study Variables

Variable	1	2	3	4	5
Student satisfaction$_{individual}$					
Student satisfaction$_{group}$	.96***				
Student's sex	-.11	-.10			
Level of course	.02	-.00	-.24***		
Active learning pedagogy	.16***	.15***	-.16**	.26***	
N	248	248	245	248	246
M	2.6	2.6	.66	.20	9.87
SD	.57	.60	.47	.40	4.10

*p < .10; **p < .05; ***p < .01.

Hypothesis 2: Active Learning Pedagogical Activities Will Influence Students' Satisfaction with Their Group Learning Process Positively. We conducted an ordinary least squares (OLS) regression analysis to predict student satisfaction$_{group}$ from active learning pedagogy (Table 4 displays the results). Predictors were entered hierarchically: Model 1 includes control variables only (e.g., sex, level of course), Model 2 includes control variables and classroom type (e.g. traditional vs. active learning classroom), and Model 3 incorporates all variables, including active learning pedagogy. Model 2 explained a proportion of the variance in student satisfaction$_{group}$, R^2 = .14, F (3, 349) = 2.18, p = .090. Classroom type was a statistically significant predictor of student satisfaction$_{group}$, B = -.15, p = .032, suggesting that with the control variables held constant, the variable "active learning classroom" was associated with higher student satisfaction$_{group}$ as compared to the variable "traditional classroom." Model 3 explained a proportion of the variance in student satisfaction$_{group}$, R^2 = .18, F (4, 348) = 3.04, p = .017. Active learning pedagogy was a statistically significant predictor of student satisfaction$_{group}$, B = .02, p = .019, supporting Hypothesis 2, suggesting that with control variables held constant and the classroom type considered, the number of active learning pedagogy methods was positively associated with student satisfaction$_{group}$. Sex of student (B = - .06, p = .364) and level of course (B = -.05, p = .524) remained statistically significant.

Hypothesis 3: Active Learning Pedagogical Activities in Traditional Classrooms Will Influence Students' Satisfaction with Their Individual Learning Process Positively. Table 5 displays the means, standard deviations, and bivariate correlations for the study variables for Hypotheses 3-4, which are

regressions of satisfaction$_{individual}$ (Hypothesis 3) and satisfaction$_{group}$ (Hypothesis 4) on active learning pedagogy in a traditional classroom setting. The study variable that significantly correlated with satisfaction$_{individual}$ was active learning pedagogy (r = .16, p < .01). The study variable that significantly correlated with satisfaction$_{group}$ was also active learning pedagogy (r = .15, p < .01).

We conducted an ordinary least squares (OLS) regression analysis to predict student satisfaction$_{individual}$ within traditional classroom from active learning pedagogy (Table 6 displays the results). Predictors were entered hierarchically: Model 1 includes control variables only (e.g., sex, level of course), and Model 2 includes all variables including active learning pedagogy. Model 2 explained a proportion of the variance in student satisfaction$_{individual}$, R^2 = .18, F (3, 239) = 2.75, p = .043. Active learning pedagogy was a statistically significant predictor of student satisfaction$_{individual}$, B = .02, p = .024, supporting Hypothesis 3 and thus suggesting that with control variables held constant, the number of active learning pedagogy methods in traditional classrooms was positively associated with student satisfaction$_{individual}$. Sex of student (B = - .12, p = .142) and level of course (B = -.06, p = .511) were not statistically significant.

Hypothesis 4: Active Learning Pedagogical Activities in Traditional Classrooms Will Influence Students' Satisfaction with Their Group Learning Process Positively. We conducted an ordinary least squares (OLS) regression analysis to predict student satisfaction$_{group}$ within traditional classroom from active learning pedagogy (Table 7 displays the results). Predictors were entered hierarchically: Model 1 includes control variables only (e.g., sex, level of course), and Model 2 includes all variables including active learning pedagogy. Model 2 explained a proportion of the variance in student satisfaction$_{group}$, R^2 = .17, F (3, 239) = 2.44, p = .065. Active learning pedagogy was a statistically significant predictor of student satisfaction$_{group}$, B = .02, p = .025, supporting Hypothesis 4 and suggesting that with control variables held constant, the number of active learning pedagogy methods in traditional classrooms was positively associated with student satisfaction$_{group}$. Sex of student (B = - .10, p = .213) and level of course (B = -.10, p = .342) were not statistically significant.

Discussion

Are students satisfied with their individual learning process when active learning pedagogy was used in a traditional classroom? Students were satisfied with their individual learning process in a traditional classroom when active learning pedagogy was used. From the results of Hypothesis 1 and Hypothesis 3 that tested if active learning pedagogical activities affected students' satisfaction with the individual learning process, it was observed that students' satisfaction with individual learning process was significantly increased in ALCs compared to measures of satisfaction in traditional classrooms. This may be due to the large screen TVs available for each group, writable walls, and the movable tables present in ALCs. These elements may contribute to an atmosphere of active learning and thus encourage students to feel more satisfied with their learning process. While students showed higher satisfaction with their individual learning process in ALCs than those in traditional classrooms, further results clearly showed students' satisfaction in both active learning and traditional classrooms were significantly related to active learning pedagogical activities. Satisfaction was not significantly related to gender or level of course (undergraduate or graduate).

As for the characteristics of classrooms, both active learning classrooms and traditional classrooms may be considered not to be optimal for students' individual learning process. Active learning classrooms are ideal for enhancing student engagement in groups, and traditional classrooms are efficient for delivering information. However, our finding suggests active learning pedagogical activities make it possible for students to be satisfied with their individual learning process. It is consistent with the study where students' evaluation on their learning goals became more positive when active learning and student-centered pedagogy were utilized, and students attitudes were improved (Armbruster et al., 2009).

Are students satisfied with their group learning process when active learning pedagogy was used in a traditional classroom? Not only with their individual learning process, but also with their group learning process (Hypothesis 2 and Hypothesis 4), students' satisfaction was increased in ALCs than those in traditional classrooms. This is not surprising because active learning classrooms are designed specifically for efficient group work: ALCs with eight chairs around each circled and positioned table, TV screens for each grouped table, and four writable walls may enhance students' satisfaction with their group learning process. More notably, further results give much hope to faculty teaching in traditional classrooms. Students' satisfaction with their group learning process in traditional classrooms were affected by active learning pedagogical activities. Even in the traditional classroom where there are only either desks or chairs at rectangular tables, one or two white board(s), and a computer with a projector, students can feel satisfied with their group learning process when active learning pedagogy activities are implemented. Active learning pedagogy activities seem to be able to override the rigidity of classroom structure in the student group learning process.

Table 6
Ordinary Least Squares Regression Analyses Predicting Student Satisfaction$_{individual}$ in Traditional Classrooms from Active Learning Pedagogy

Predictor	*B*	β	*t*	R^2
Model 1				.11
Student's sex	-.14*	-.11*	-1.71*	
Level of course	-.01	-.00	-.12	
Model 2				.18*
Student's sex	-.12	-.10	-1.47	
Level of course	-.06	-.04	-.66	
Active Learning Pedagogy	.02**	.15**	2.28**	

*p < .10; **p < .05; ***p < .01.

Table 7
Ordinary Least Squares Regression Analyses Predicting Student Satisfiaction$_{group}$ in Traditional Classrooms from Active Learning Pedagogy

Predictor	*B*	β	*t*	R^2
Model 1				.11
Student's sex	-.13	-.10	-1.71*	
Level of course	-.04	-.03	-.12	
Model 2				.17*
Student's sex	-.10	-.08	-1.47	
Level of course	-.10	-.06	-.66	
Active Learning Pedagogy	.02**	.15**	2.28**	

*p < .10; **p < .05; ***p < .01

Does a classroom have to be configured as an active learning classroom to successfully accommodate active learning pedagogical activities as measured by student satisfaction? While this study confirmed that space may help enhance active learning pedagogical activities (Brooks, 2012), further analysis showed that intentional implementation of active learning pedagogy can enhance students' satisfaction with their learning process no matter where one is teaching. It means active learning pedagogy is the key. Whether space is accommodated in active learning classrooms or in classrooms that have no benefits for students' active engagement, instructors' intentional planning and implementation of activities help students' learning processes. It means instructors need to bring resources on their own that will help group work (e.g., markers, a large paper, tapes, etc.) relevant to active learning pedagogy activities. It also suggests that not all the classrooms have to be remodeled for students' active engagement.

Can active learning pedagogy be executed effectively into traditional classrooms as measured by student satisfaction? Some researchers prefer lecture format, and other researchers argue that both lecture format and other instructional methods need to be used according to the subject matter and the objectives of the class. Our results appear to add to the literature supporting the supposition that more engagement methods would be more appreciated by students no matter where they are. Brooks (2012) found in his study that in the traditional classrooms, faculty are more likely to stay at the podium and to utilize a lecture format. Space is a huge factor impacting faculty's behaviors. However, this study confirms that faculty can intentionally provide more active learning pedagogical activities in traditional classrooms and, in turn, students' satisfaction with their learning process can be increased. This confirms that faculty are crucial to students' learning (Umbach & Wawrzynski, 2005).

Our findings also add to the literature an important notion that faculty do not need to completely make over their whole curriculum to involve students' in active engagement. Although this study primarily concentrated on student satisfaction, preliminary analysis of the types of active learning activities that were transferred into the TC by report of frequency included large and small group activities, the work of individuals or groups of students being displayed or projected to the whole class, and faculty interaction with individuals or groups of students. As indicated in the methods section, active learning pedagogy in this study was defined as using any of these active learning pedagogy activities once a week (ranging 1-18). At least one active learning pedagogical activity, especially in a graduate course where students meet in class once a week, can be enough for students to feel satisfied with their learning processes.

Anecdotally, faculty members in the active learning community (ALC) shared that they tended to spend more time before class in class preparation once they were committed to active learning pedagogy. This is consistent to Niemi's research (2002) with student teachers in teacher education. With active learning pedagogy, the teacher acts more as a facilitator rather than a lecturer, by both making students more responsible for their own learning and using students as resources for their learning. While ALCs may make it easier for faculty to use more active learning instructional methods by being set up to encourage group activities, in traditional classroom settings the faculty have to be self-motivated to provide more active learning pedagogical activities, to pay more attention to orchestrating when the activities need to be implemented and how they should be implemented, and to observe how students learn through the activities in the classroom. In this case, what is needed is support for faculty. Such as a community group where faculty members can motivate each other to be more cognizant of what they are doing in classroom, share ideas of active learning pedagogical activities, and encourage each other to use active learning pedagogical activities more often. Professional development workshops for active learning pedagogy may help more faculty members be committed to practicing active learning pedagogy and maintain their practice with active learning pedagogy.

Active Learning Pedagogy Beyond Undergraduate Engineering and Science

A significant result of this study concerns the use of active learning pedagogy in classrooms other than engineering or science, as well as in graduate classrooms. This study showed that students' satisfaction both with their individual and group learning process was positively affected by active learning pedagogical activities both at the undergraduate and graduate level. It is clear from the results that active learning pedagogy can increase students' satisfaction in their learning process (both individual and group) even at the graduate level. In particular, the results may have special salience for the participants we studied. It is worth to note that the classes are not engineering or science courses: participating undergraduate courses are business, economics, geography, political science, and theology, and graduate levels are business and education related courses. Students in the courses other than engineering and/or sciences can benefit from faculty's active learning pedagogical approaches.

Limitations and Future Research

This study has several limitations. First, there may be an error in students' perception of how intensively the active learning methods were used, as was illustrated in surveys given to students after the quarter was almost finished. Students may not remember exactly how many times active learning instructional methods were used in their course. At the same time, some students may not pay good attention to instructional methods. Therefore, the reported instructional methods by the students in the study can be very subjective. Given that the frequency of instructional methods can be lower than what really happened in class, the results of this study can be considered to be very significant.

Second, objective documentation on what kinds of active learning pedagogy activities are used in a classroom would make a study stronger. Also, examining both the instructor's and students' perception on active learning pedagogy activities would be worthwhile in order to see how students' metacognitive awareness helps increase their satisfaction of learning process as well as learning itself.

Third, the results may not be generalizable because of the size of the participant pool. We had only 317 undergraduate students and 67 graduate students. At the same time, the number of classes was pretty small. An expanded model with more classes would make generalization more feasible.

Fourth, since this current study did not collect the evaluation piece of the student outcomes in classes, we may not see what kind of connections students' satisfaction can have with students' outcomes. A study to examine a direct connection between students' satisfaction and learning outcomes in both undergraduate and graduate levels with active learning pedagogies would be beneficial.

Conclusion

While this study has several limitations, the results are worthwhile to show active learning pedagogy activities are a significant factor in positively influencing students' satisfaction with their individual and group learning processes in both active learning classrooms and traditional classrooms. At the same time, this study suggests that active learning pedagogy activities affect students' satisfaction positively in graduate level courses. In higher education today, new technology is introduced, and new ways of teaching are invented and practiced. However, implementing new technologies at a large scale could be costly and sometimes impossible to implement across campus. In the limitedly equipped classrooms, learning can be promoted and enhanced with intentional implementation of active learning pedagogy activities by faculty. Faculty matter.

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